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ABSTRACT

This report is intended to provide ideas to assist professionals and students in the exploration of tangible symbols for intervention purposes in working with visually capable individuals with disabilities. The first section provides an overview of tangible symbols and discusses the differences between tangible symbols and tangible objects, when and why a tangible symbols system should be used, how tangible symbols can be used, what types of tangible symbols may be used to support communication use and the understanding of messages, the most important considerations that could impact tangible symbol selection, and general considerations to guide symbol selection. The second section focuses on the usage of tangible symbols and describes how tangible symbols can be displayed for schedule/calendar, sequence, choice, and communication displays; the appearance of a tangible object schedule; a tangible symbol sequence display; a tangible choice board display; and a tangible symbol communication display. Appendices include a description of communicative functions and a checklist to use when considering programming with tangible symbols. (CR)

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Indiana Resource Center for Autism

Using Tangible Symbols for Communication Purposes: An Optional Step in Building the Two-Way Communication Process

Beverly Vicker

Institute for the Study of Developmental Disabilities
The University Affiliated Program of Indiana
Indiana Resource Center for Autism
Indiana University, Bloomington

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Preface

Using Tangible Symbols for Communication Purposes: An Optional Step in Building the Two-Way Communication Process is intended to provide ideas to assist professionals and students in professional training in the exploration of tangible symbols for intervention purposes. The content should be applicable to diverse disability populations.

Predictably, some readers will be disappointed; the publication is not a cookbook that tells what to do in a step by step fashion. Instead, it provides insights that will empower some individuals to explore the option of using tangible symbols. For others, it may provide the guidance needed to improve present programming. Successful implementation of tangible symbols, as with most other intervention strategies, still requires an adequate definition of the parameters of a problem, a course of action, and a fine tuning for the individual and his or her diverse learning characteristics, needs, and strengths. Hopefully, *Using Tangible Symbols for Communication Purposes: An Optional Step in Building the Two-Way Communication Process* will make that process less frustrating for service providers and considerably more successful for individuals with communication disabilities.

Acknowledgments

Several people were instrumental in the preparation of this publication and they merit a public acknowledgment. First of all, Sally Mohler from Purdue University deserves considerable credit for her insightful suggestions that resulted in the expansion of this publication from its conception as a training paper to this present multi-page publication. Others who contributed to the development, editing or text preparation include Cathy Pratt, Mark Best, Annamaria Mecca, and Beverly Sturgeon from Indiana University. Finally, production credit must also be ascribed to Robin Herman who provided the cover design and suggestions for layout. Each unique contribution to the publication is graciously appreciated.

B.A.V.

Table of Contents

A. Introduction to Tangible Symbols 1

What are tangible symbols and are they the same as tangible objects? 1

When and why might a tangible symbols system be used? 3

How might tangible symbols be used? 4

What types of tangible symbols may be used to support communication use and the understanding of messages? 4

What are the most important considerations that could impact tangible symbol selection? 7

What general considerations can guide symbol selection? 9

B. Usage of Tangible Symbols 11

How might tangible symbols be displayed for schedule/calendar, sequence, choice, and communication displays? 11

What might be the appearance of a tangible object schedule? 13

What might be the appearance of a tangible symbol sequence display? 16

What might be the appearance of a tangible choice board display? 20

What might be the appearance of a tangible symbol communication display? . . . 21

Where does one begin (i.e., with a schedule, sequence, choice or communication display)? 27

C. References and Supplementary Reading 30

D. Appendices 31

Appendix A: Communicative Functions 33

Appendix B: Checklist When Considering Programming with Tangible Symbols 37

Introduction to Tangible Symbols

For some individuals with dual sensory impairment (i.e., deafness and blindness), tangible symbols represent a primary means of facilitating limited, but functional mutual communication. The option of using tangible symbols, however, is often overlooked when educators or service providers plan augmentative and alternative communication intervention (AAC) with *visually capable* individuals. In the latter instance, emphasis is usually placed on the use of manual signs, gestures, communication boards, or electronic communication devices as means for expressive output. In retrospect, some sighted AAC users might have been more successful during early intervention if AAC programming had begun with tangible symbols for representation. The following discussion may assist educators, and service providers in understanding when and how to explore the use of this under-utilized AAC option for both receptive and expressive communication.

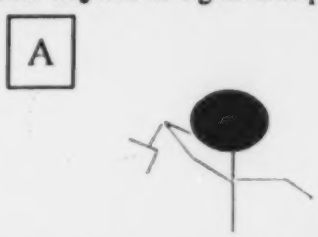
What are tangible symbols and are they the same as tangible objects?

Tangible symbols are three dimensional tangible objects that can be used for assisting the expression or understanding of communicative messages. The symbols can be actual sized objects, miniatures, a piece of the actual sized object, or something that is associated with an intended message. These representations can be seen, touched, manipulated, or physically transferred to other people. The key concept to understand is the word "symbol"; it implies that some type of visible representation (i.e., a concrete object or visible substance) is used to *signify something else*, such as a person, object, action, or idea.

Tangible objects, on the other hand, can be viewed as merely objects that might be the focus of a communication interchange. They do not represent something else as tangible symbols do, but they share the features of being able to be seen, touched, manipulated, and transferred to others. Tangible symbols for an AAC system will always be tangible substances, but the reverse is not always true. In a given situation, a tangible object may not represent a tangible symbol. This distinction with regard to real objects may be easier to understand if an illustration is used (see Figure 1). Later examples will illustrate the use of miniatures and associative objects for symbolic meaning.

Figure 1. Tangible Objects vs. Tangible Symbols

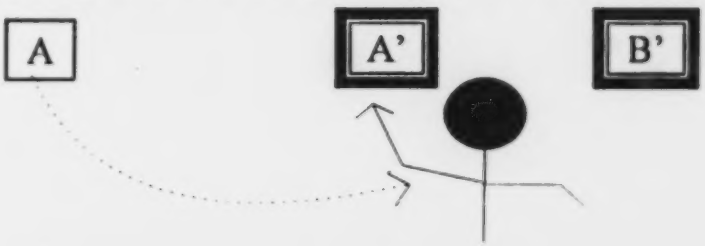
Situation 1. Use of a tangible object. Use of a real pretzel (A) and a cracker (B) as **tangible objects** to signal a request for "cracker" or "pretzel."



Object Use

The teacher holds out her hands to the student. In one hand she has a pretzel and in the other a cracker. She asks the child which one he wants. The child selects the pretzel and takes it from the teachers's hand.

Situation 2. Use of tangible symbol. Use of a real pretzel (A') and a cracker (B') as **tangible symbols** to signal a request for "cracker" or "pretzel."



Symbol Use

The scene begins the same as Situation 1, except that a pretzel and cracker are glued to separate pieces of poster board. When the child selects the pretzel, the teacher acknowledges the response and gives the child a pretzel from an out-of-sight box sitting on the counter. *If the child can see the actual item on the counter that he or she wants, then he or she may point to that instead of the symbol. It is not considered best practices in AAC to ignore a legitimate and understandable communicative gesture and to solely insist on a different type of response such as pointing to the symbol. If it appears necessary to keep the targeted food supply (A) at least partially in view during the early stages of programming, perhaps the individual could be given a quick physically assisted touch to the symbol (A') before a direct point or movement toward (A) could occur.*

(A') could be an identical object, a miniature of a similar object, part of an object, an associative symbol, or an abstract symbol.

In Figure 1, the glued down pretzel was a symbol for the edible pretzels that were in the pretzel box. The teacher also could have used a pretzel in a plastic Baggie® as her tangible symbol.

The results of a sampling activity can help the teacher or service provider decide whether to begin his or her programming with a focus on tangible objects or tangible symbols. Some individuals quickly grasp the concept of symbolization. Others may become confused by tangible symbols during the sampling procedure but they may become less frustrated as tangible object use is reintroduced. Some individuals in this latter group may require many trials over a prolonged period of time before they can successfully make the transition to tangible symbol use. A few may never make that cognitive leap but may learn some associated meanings through repeated exposure.

When and why might a tangible symbols system be used?

Not everyone needs the preliminary step of using tangible symbols before moving to a picture or word/letter based communication display. Many individuals are ready to begin AAC programming at a two-dimensional symbolic-based level.

Tangible symbols may be introduced as part of a sampling or diagnostic intervention when someone is uncertain about beginning with two dimensional stimuli. Three dimensional objects may be more interesting and motivating than two dimensional, particularly for young children. As the individual demonstrates successful tangible symbol use, then programming would shift to the two dimensional symbols.

While the shift from three dimensional to two dimensional symbols may be viewed as positive or progressive, sometimes the reverse is needed, at least on a temporary basis. Although one may be tempted to view the shift from two dimensional to three as regressive or discouraging,[1] it can often represent a very positive strategy. The shift may be necessary because either the

[1]The shift may be perceived as negative by some service providers because tangible symbols are considered to be more concrete, that is less abstract than pictures or printed words. Tangible symbols are also bulky, cumbersome, and less easily accessible than, for example, Picture Communication Symbols (Mayer-Johnson).

programmer or intervention agent over-estimated the individual's ability to use two dimensional symbols or because some aspect about the two dimensional programming is hindering success. In the latter instance, a return to a more concrete level of programming may allow the individual to experience success and to better understand the symbolization process as used for AAC. In the interim, the programmer or interventionist will have gained time to problem solve regarding the two dimensional picture display. Typically, factors that may contribute to the poor success rate with picture displays include one or more of the following: inadequate training techniques, improper selection of vocabulary, limited or no organization of the picture display, picture symbols that carry no associative meaning for the user, and too small, too many or too perceptually indistinct pictures used on the display.

How might tangible symbols be used?

Tangible symbols can be used to convey information for a variety of purposes. The formats for information displays include:

- Schedules or calendars;
- Sequence displays;
- Choice displays; and
- Multi-message communication displays.

Later, examples of each of these will illustrate the functional use of symbols.

What types of tangible symbols may be used to support communication use and the understanding of messages?

Tangible symbols can support or enhance the understanding of messages from others. Schedule, sequence, and choice displays represent receptive communication displays. Tangible symbols also can be used in the opposite manner. They can become the vehicle for active, expressive, communication messages when used on electronic or non-electronic communication displays. In Table 1, examples are provided to illustrate how objects that share similar parameters might be used in a variety of communicative ways. **The list is not in a hierarchial or developmental order, and should not be considered as possessing such characteristics.**

Table 1. Example of Tangible Symbol Use

Description of Symbol Type	Example	Type of Display	Possible Messages and Functions (these examples cross the age range)
Identical or similar *real* object	Glass	Communication display	"Want drink" *Function: Request object*
	Toothbrush	Schedule	"Time to brush teeth"
Identical or similar *imitation* object	Plastic fork	Sequence	"Next, get the forks for the table"
	Plastic apple	Choice board	"Want to eat an apple"
		Schedule	"We're going to the apple orchard."
Miniature object (may or may not be physically identical to real object)	Metal match box size van	Schedule	"Time to go to work"
		Communication display	"I want to go somewhere." *Function: Request activity*
Associative object	Box from raisins	Choice board	"I want some raisins."
	Roll of bathroom tissue	Schedule	"Time to go to the bathroom"
	Computer disk	Communication display	"I want to play on the computer." *Function: Request activity*
Partial piece of object or set	Handgrip for bike handlebar	Communication display	"Take me for a bike ride?" *Function: Request for information, (i.e., affirmation), as suggested by quizzical facial expression and lack of insistence*
	Small piece of synthetic fur	Communication display	"Get my furry hooded jacket and let's go outside." *Function: Request activity*
	A Crayola®	Communication display	"Crayons, please?" *Function: Requests permission (to get crayons)*

Continued from page 5

Description of Symbol Type	Example	Type of Display	Possible Messages and Functions (these examples cross the age range)
Generic symbol—real object that represents a class of objects	A cracker mounted on a card	Communication display	"I'd like a cracker (you'll have to guess what kind because I can't be specific)." Also "I'd like food (instead of a drink)." *Function: Request object*
	Blank audiotape	Communication board	"I'd like to listen to my music; I'll pick out the tape." *Function: Giving information*
Abstract symbol—may represent specific or generic representation	Wild card	Schedule	"My choice of what I may want to do." *Could also represent changes in schedule such as field trip; special guest; or a surprise.*
	French fry bag that says "McDonalds"	Communication display	"Let's go to McDonalds" or "Let's go out to eat." (Doesn't have to be McDonalds.) *Function: Request activity*
	Textured square of blue terry cloth	Schedule	"Time to go swimming"

Everyone communicates for a purpose, and the person who has a disability is no exception. Many categorization systems exist to define communicative functions. The typical list would include functions such as:

- Requesting an object, action, assistance or attention;
- Requesting permission or directions;
- Requesting/needing information;
- Refusing, rejecting, or protesting;
- Expressing denial;
- Naming or commenting on objects, people, or activities;
- Commenting on self or expressing feelings;

- Expressing agreement or affirmation; and
- Engaging in social routines such as greeting, initiating conversation, and the like.

When designing a tangible symbol multi-message communication display, some consideration of communicative function is also important in planning. As illustrated in Table 1, communicative functions might include requesting of information or permission, and not just the more frequently occurring functions such as requesting an object or an activity. The AAC communication user might be taught to use facial expression, body movement, body posture, or gesturing to help signal the exact communicative intent of a message. Conversely, communication partners will need to be sure they do not, in a figurative sense, wear blinders and have narrow expectations about the message intent expressed by an AAC user. In other words, conversational partners need to be open to the possibility of the expression of multi-communicative functions, even if the frequency for some functions (e.g., requesting information) is very low. For an overview of Communicative Functions, see Attachment A in the Appendices.

What are the most important considerations that could impact tangible symbol selection?

Three things seem to be important in the selection of tangible symbols: meaning/interest level of the symbol for the individual, visual efficiency skills, and the conceptualization level of the symbol. One may not be any more important than the other two. In all probability, the three may work in concert.

Symbol selection should be individual specific. What is meaningful for one individual may not be significant for someone else. For example, a car door handle may be a salient symbol associated with going somewhere for John who has a high interest in cars or a high interest in being in the community. To someone else (e.g., Steven) the car door handle may be meaningless or appear as a shiny object in which to see reflections as it is manipulated. John, on the other hand, may not do well with learning other less personally interesting symbols that represent part-whole associations or more abstract relationships. He may have more success if only visually similar symbol representations are used (see Table 1). His highly restricted repertoire of interests might preclude the use of many abstract personal interest symbols.

Experimentation and a physician's referral may be concurrent first steps when visual efficiency is considered. While an object may be personally meaningful, its usefulness as a tangible symbol may be compromised if the individual has trouble seeing and recognizing it. The person may need glasses, a change in prescription, or assistance in learning how to most efficiently use his or her present sight. Some individuals with disabilities experience premature aging and may need assistance for near sightedness before they reach the traditional bifocal age of forty. If vision is a noncorrectable problem, then other factors need to be considered when selecting objects or symbols and when planning programming (Cooley, 1987; Goetz, Guess, & Stremel-Campbell, 1987). For visually able individuals, simply using objects of a sufficient size so that they are **easily** and **quickly recognizable** may be a sufficient intervention strategy.

The last crucial aspect related to successful use of symbols is the targeted individual's level of understanding of representation and symbolization. In Table 1, various types of symbol groupings were presented. The most **concrete** symbol would be a full scale exact duplicate of the desired item. For a choice situation, the individual might point to a specific toy from a display of two toys; the teacher would then get the duplicate toy off the shelf after the child had pointed to the original on the choice display. This example involves what is called a **transparent** symbol because it closely or exactly resembles the intended item it represents. When compared to other types of symbols, transparent symbols are usually easier to recognize and to remember in terms of what each represents.

At the other end of the continuum would be an **abstract** symbol such as an **arbitrarily** chosen textured square of fabric which could represent any assigned meaning. This type of symbol may be called opaque because there may be nothing visually apparent about the symbol (i.e., the piece of fabric) that will remind the individual of the intended association of meaning. The intended meanings or message associations will have to be **memorized**.

Other objects may fall in between a classification of opaque and transparent symbols. They are called **translucent** symbols because their meaning may not be clear **until the individual learns the association between the symbol and what it represents**. The ease of learning these meanings or associations may vary. For example, a sock may signify "get your shoes on" and may be an easy to remember symbol association.

If an individual continues to have difficulty grasping the concept of symbolism, then programming may be more successful if a non-symbol-based program is used. Sample dialogues for such programming appears in *Enhancing Nonsymbolic Communication Interaction Among Learners with Severe Disabilities* by Ellen Siegel-Causey and Doug Guess (1989).

What general considerations can guide symbol selection?

Caregivers and parents might want to consider the following:

- Does the person have object permanence? In other words, does the targeted object need to be in sight before the individual requests it? A transparent symbol to represent something that is in a cupboard, in another room, or outside of the house or school may be meaningless if the person does not understand object permanence.

- Does the individual exclusively need transparent or more concrete symbols, or can he or she use a variety of types of symbols without getting confused?

- How identical in terms of physical features does the symbol have to be in relationship to the real object? In order to use a miniature matchbox size van, does the miniature need to be the same color, shape, or manufacturer's make as the group home or family van? When it is not, can the individual make the representational connection?

- How conceptually limited does the symbol have to be in terms of meaning for the targeted individual? Can the miniature van represent the category of transportation and the act of going somewhere else regardless of whether it is by car, bus, taxi, bike, or plane? This may be too abstract for some individuals and the van should only be used to signify a specific message.

- Will the mounting or background color of the display enhance or deter recognition of the targeted object? Some individuals may need more contrast; they may do better, for example, with white, yellow, or black backgrounds for a given object.

- Does the individual need to use tactile cues to facilitate his or her learning of an associated meaning for the tangible symbol? Conversely, is the individual distracted by, or overly focused on, the tactile dimensions of a tangible symbol and oblivious to the concept or the use of symbols for meaningful message exchange?

- Does the individual recognize the symbolization for the whole or target object when he or she sees just a piece of the object? For example, does he or she envision a bike when seeing the handlebar grip?

- Does the person have good memory skills? If tangible abstract symbols are used, are they distinctly different from each other so that learning and retention will be facilitated? How many associations will the person need to learn?

- Will the person become confused if the same symbol is used for multiple meanings? For example, within the calendar or schedule box, an audiotape might mean it is time to listen to a tape selected by the teacher for learning purposes. On a choice display, it may mean choosing a personal preference from numerous tapes for a freetime activity. Will such changes in a symbol's meaning across different display contexts be understood?

The above questions demonstrate that using tangible symbols requires some analysis of options for the representation of messages, and some trial and error experimentation. The latter must occur before a tangible symbol system that is consistent with the individual's conceptual abilities or strengths can be fully implemented.

Usage of Tangible Symbols

How might tangible symbols be displayed for schedule/calendar, sequence, choice, and communication displays?

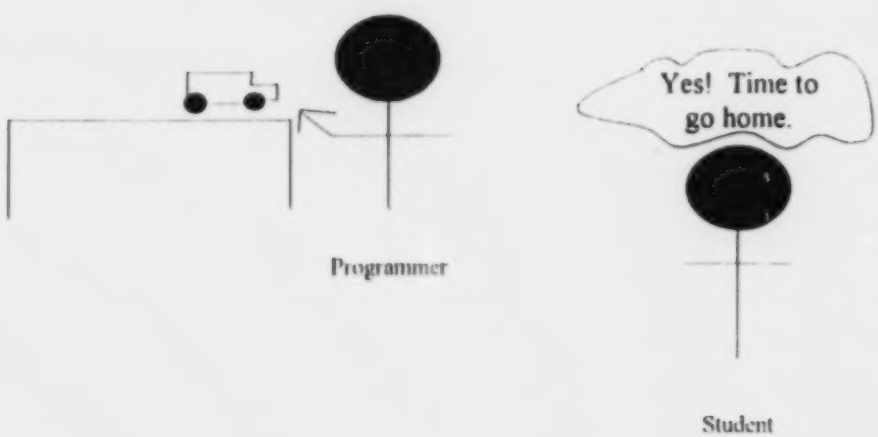
The options for display rest with the creativity of the caregivers and the amount of display that can be visible at any one time without confusing the individual. With regard to the latter, for some individuals, perhaps only one or two items should be visible at any given time. Knowing what will produce distraction, overload, and confusion becomes an important programming objective.

Calendars or schedules with tangible symbols can be presented in several ways. Some individuals use a horizontal box with dividers and individual compartment covers for each schedule box section. When the latter is used, preservation of the left to right orientation is important for supporting literacy. Others may use a vertical display using Baggies® with objects inside of them; the Baggies® are mounted by Velcro® to the display. A stack of mini-storage crates with objects symbolizing the various activities represents another alternative display. The important thing is that each item is large enough for the individual to easily recognize from whatever distance the display is located in relationship to him or her (see Figure 2). Equally important is that schedule, sequence, choice, or communication displays are customized to each person's needs.

Figure 2. Size/Recognition of Tangible Symbol Relative to Distance/Visual Acuity of the Person with Disabilities

Situation 1. Too small/too far.

Situation 2. Large enough/close enough.



Tangible objects also can be used with both electronic and non-electronic communication displays, and can be used as input to build comprehension, vocabulary recognition, and modeling of augmented communicative output. Objects may be permanently mounted on a display or held in place by tape, Velcro®, or other means.

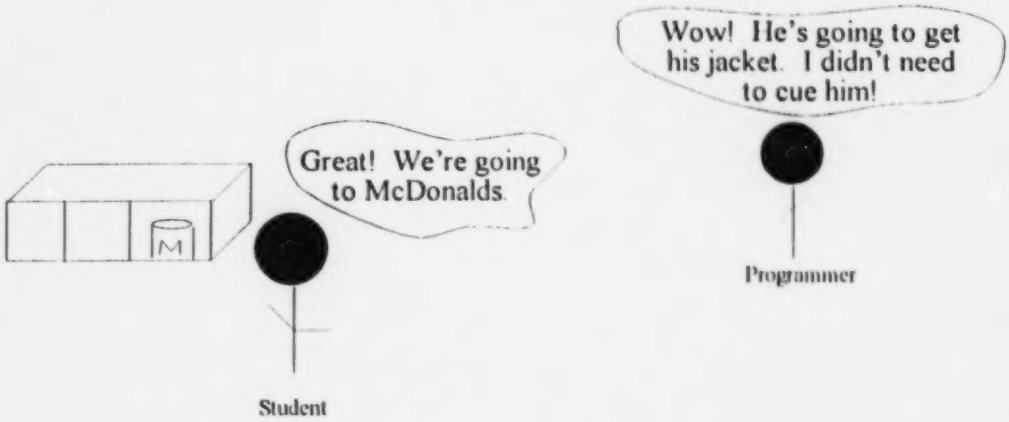
What might be the appearance of a tangible object schedule?

A tangible object schedule could involve a formal or informal means of display (see Figure 3). A formal display would necessitate some physical means for holding or displaying one or more objects (only one object would be displayed at a given moment, however). For an informal display, someone might merely pick up a tangible symbol and hold it in his or her hand to focus attention and to aid the comprehension of a spoken message about a transition to another environment. Various tangible symbols might be kept in a "word box" or "vocabulary box" and symbols could be selected in advance or as needed from the box. A specific individual may be presented with both formal and informal displays at different times during a given day, although the underlying purposes or circumstances might differ.

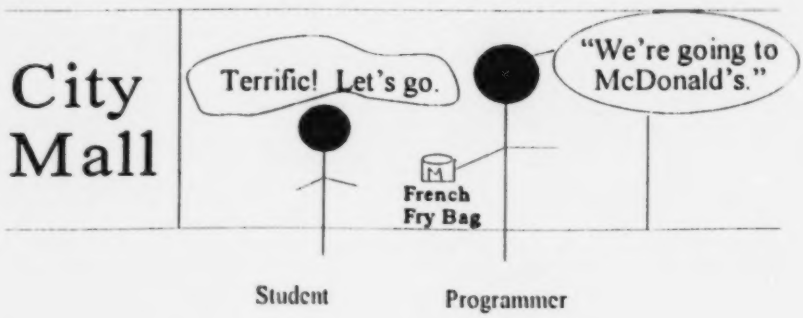
A free standing or formal display is generally used when the objective is to have the individual learn to independently check his schedule and move on to the next activity. Schedules can be as complex or as simple as an individual's needs or the circumstances dictate. For example, in the community it would be difficult, if not impossible, to use a permanent display of objects. In this instance, independence or self management training may be sacrificed in exchange for expediency (see Figure 3). In the community, caregivers will want to avoid accidentally promoting an outburst or aggression because the person with disabilities did not understand the verbal information about a transition to a new location (e.g., "Next, we're going to McDonalds."). Showing the person a single tangible item in that instance would be the most preferable practice. The visual aid (i.e., in Figure 3 the tangible symbol of an empty french fry bag bearing the McDonald's logo) might help the individual to remain calm, cooperative, and happy. The empty bag would signal for him that he will go to McDonalds after he leaves the mall. Because he understands and likes the message, he prepares himself for the transition to the parking lot in order to go to McDonalds.

Figure 3. The Purpose/Circumstances May Dictate Whether a Formal Display Is Used for a Tangible Symbol

Situation 1. Independence at school/home (formal display frame).



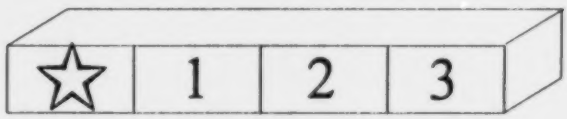
Situation 2. Expediency in community (informal display).



Different strategies may be needed in other circumstances. Figure 4 provides an example of a tangible symbol schedule for a preschooler. If an individual is initially reluctant to go to the display and an outburst occurs, the teacher or programmer may want to bring the object to the child and pair it with the verbal message (*a strategy of expediency*). After the child has learned to process information regarding an upcoming transition and is successful at doing so, the presentation method may be progressively altered. The child initially might be assisted to walk over to the display. Eventually, he or she may become independent at checking for transition information.

Figure 4. Hypothetical Tangible Symbol Schedule for a Preschooler

Schedule: Time period from 9:30-10:30
Variations: Cannot go outside on some days; substitute site is the commons area
Symbolization: Mixed types of tangible symbols
Display: Horizontal display of small crates hooked together; pieces of cloth over items that are not describing the present message



Uncovered: Star
Covered: (1) Tiny piece of carpet
(2) Block
(3) Grass or floor tile, depending on the weather

Procedures are: (Individualized for hypothetical preschooler)

1. Lead the child to the sequence display shelf to return the symbol that represented the 9-9:30 time slot and pull down the cloth used to cover the mini-crate.
2. Uncover or help the child uncover the next crate. Relay the message associated with the object, such as, "Time to go to X."
3. Take the item that represents X and carry it to where the child needs to be next. Deposit the item in a crate which has the same symbol. *The child can carry the item, if he or she will willingly deposit it in the mini-crate in the new area.* The purpose of taking the object to the next environment is that it provides a focus while the child is in transit. Because the object is matched to its identical referent (i.e., a tangible symbol) in the new situation, the child has both an understanding of the intended message and a sense of where he is supposed to be.

(The carrying/matching of the object is an option. For some children, they may be shown the object by an adult or they may find it on their own and then take the cue to guide their own behavior [i.e., to go to the designated area suggested by the symbol]. Independence is still the objective if the child is likely to use tangible symbols for any extensive length of time.)

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Figure 4. Hypothetical Tangible Symbol Schedule for a Preschooler (continued)

Translation of schedule for 9:30-10:30.

Object	Message	Type of Symbol Used
Small plastic red star	"Time to sit at the table," (i.e., find the crate on the table; sit in the chair in front of the crate).	Abstract, but star is matched to identical mate
Tiny piece of carpet	"Sit on the carpet square for story time."	Part-whole
Block	"Jason is waiting for you. Jason is in the block area."	Partial piece of set
Preserved pieces of grass or small pebbles taped to an index card	"Time to go outside."	Part-whole associative
For a rainy day, a piece of floor tile	*"Time to play in the Commons."*	*Part-whole and generic, if not identical or similar to the real floor's tile*

What might be the appearance of a tangible symbol sequence display?

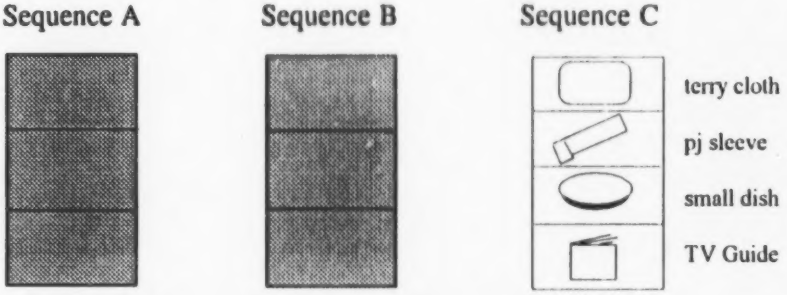
A sequence display shares many of the same characteristics and purposes as a schedule display. The primary difference is that a sequence display marks steps within an activity or event rather than between events. The unit of time could range from a duration of a minute to a longer block of time at a given step. The size of the gradation of steps might be reflective of a given individual's learning/retention abilities and where he or she is within a skill acquisition cycle. The size may also represent the ability of a programmer to have tangible symbol representation for the various steps. For example, during the early training phase of teaching an individual to shampoo his or her hair, the programmer may need to teach getting one's hair wet, unscrewing the cap of the shampoo bottle, putting a quarter size amount of shampoo in one's hand, putting the shampoo on top of one's head, using both hands to swish the shampoo around while counting to 20 (cue for duration), and then putting one's head under the shower until no more soap is visible by the shower drain. From a practical standpoint, it would be difficult to develop the visual cues for each of these steps, much less for the person to visualize the cues while taking a shower. It might be

more appropriate for the programmer to introduce a tangible symbol once the person is familiar but not necessarily independent with the sequence. A miniature shampoo bottle could then represent the cue for the upcoming event and the person could become prepared to be cued through the sequence. Or, the bottle could be the cue for the individual to begin this activity within the showering routine while having support, as needed.

Figure 5 provides an example of a combination schedule-sequence for an adult doing a shower routine; the steps are somewhat global. Sequences, like schedules, reflect individual specific needs in terms of content, complexity, and expediency. While an adult may be expected to independently take a shower, a preschooler would not. Regardless of whether the sequence described is replicable or not for a given individual, the example does depict the potential of this technique with tangible symbols.

Figure 5. Hypothetical Tangible Symbol Sequence/Schedule for an Adult

Sequence:	Shower time
Schedule:	Covers events from entering the bathroom for a shower until just before brushing teeth and bedtime (approximately 1 and ½ hours)
Variations:	Some nights, there is no shampoo. Rewards at end of shower sequence also vary.
Symbolization:	Mixed types of tangible symbols
Display:	Small plastic crates stacked together into three vertical displays. Two are draped or sitting elsewhere while one is exposed.



Procedure: (Individualized for hypothetical adult)

1. Show adult sequence for after-shower. "First, shower..." and point in direction of shower and then to the last box for items/messages for Sequence C. This identifies the reward at the end, such as, "... then, TV."

2. Cover Sequence C and expose Sequence A. Review or cue as needed. The goal is independent self cuing from the objects. Once completed, remove Sequence A.

3. Move the stack for Sequence B to the ledge of the shower to guide the person through the sequence. Review prior to moving away but provide cues, as appropriate, or as needed. (The end goal continues to be independence with the sequence by using the tangible symbol cues. It may be difficult to expose the display during the entire shower, however.)

4. Expose Sequence C.

Figure 5. Hypothetical Tangible Symbol Sequence/Schedule for an Adult (continued)

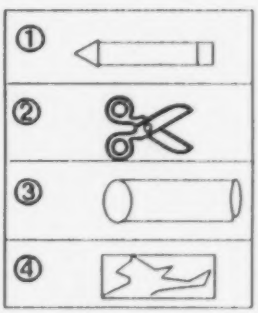
Translation of object-meaning for shower sequence.

Object	Message	Type of Symbol Used
Sequence A -- before getting into the shower		
Small roll of bathroom tissue	"Time to use the toilet" *(rather than relieving oneself in the shower).*	Associative
Slightly soiled shirt sleeve	"Remove your clothing."	Part-whole
Small piece of wicker similar to the bathroom hamper	"Put clothes in the hamper in the bathroom."	Part-whole
Sequence B -- in the shower		
Faucet handle obtained from a garage sale	"Turn on the water." *(If this can be done independently and safely with regard to water temperature).*	Similar, but not identical
Small bar of soap from a hotel stay	"Wash yourself with soap."	Miniature and generic
Sample trial size bottle of shampoo	"Yes, it's shampoo night; shampoo your hair."	Miniature of his favorite brand
Sequence C -- out of the shower		
Piece of terry cloth	"Time to dry off."	Part-whole generic symbol that represents various colored towels
Piece of sleeve from old pajamas	"Get into pajamas."	Part-whole and generic
Small empty dish	"Let's get some ice cream."	Associative
TV Guide	"Then let's watch TV."	Associative

Sequences are not limited to daily care routines. They are also useful for defining steps within other activities. For example, for a preschooler, a mounted object display could provide cues whenever the child quickly forgets his teacher's verbal instructions. A vertical display of (a) a crayon, (b) scissors, (c) a glue stick, and (d) the finished art product could remind the child to

color and cut **BEFORE** using the glue stick (see Figure 6). The technique of using a sequence not only fosters the remembering and processing of instructions but also fosters independence and the sense of self-esteem that can result from one being able to do something without adult direction.

Figure 6. Hypothetical Tangible Symbol Sequence Display for a Preschooler



Crayon

Scissors

Glue stick

Art product

What might be the appearance of a tangible choice board display?

Choice making allows an individual to have some control over a given situation. Some individuals, both with and without disabilities, have a strong need for this type of control. Other individuals are unable to make choices because they don't like to make a choice or because they do not have a preference or interest in the options offered. Additional programming strategies might be needed to circumvent the latter situations.

Previous considerations apply regarding the number of items, size of items, and display options. Many choices, particularly in the food area, are easier to represent by using the real object rather than a miniature or an associative response object. While it might be easier to just show two real items for choices, the tangible symbol vs. tangible object distinction must be clear in the mind of the programmer. It may be better to clearly define status by offering real tangible objects without mounting or without an encompassing enclosure. For example, loose object choices might be shown in someone's hand, from a table or shelf, or from a compartment display unit. If the same loose food item is to be used symbolically, that is, if it stands for an identical piece of food or a stock of food (e.g., several crackers), then it might be more clearly recognized as a symbol if it

was mounted by Velcro®, glue or tape, or held in something such as a Baggie®. When both uses are part of the person's daily experiences or training program, the distinction between objects and symbol use must be clearly signaled.

Similar physical enclosures or mountings may be needed when attempting to use actual size non-edible objects in a symbolic manner (e.g., a specific toy). In specific individualized situations when these real objects will be used symbolically, a physical selective enclosure or mounting may reduce symbol vs. object use confusion. Not everyone needs physical contextual cues. Other individuals may have a strong conceptual notion of the symbolization cue process and may be able to use symbols without cues and without confusion. Experimentation will be necessary.

Practical Situations for the Use of Non-Edible Tangible Symbols for Choice Making and Control

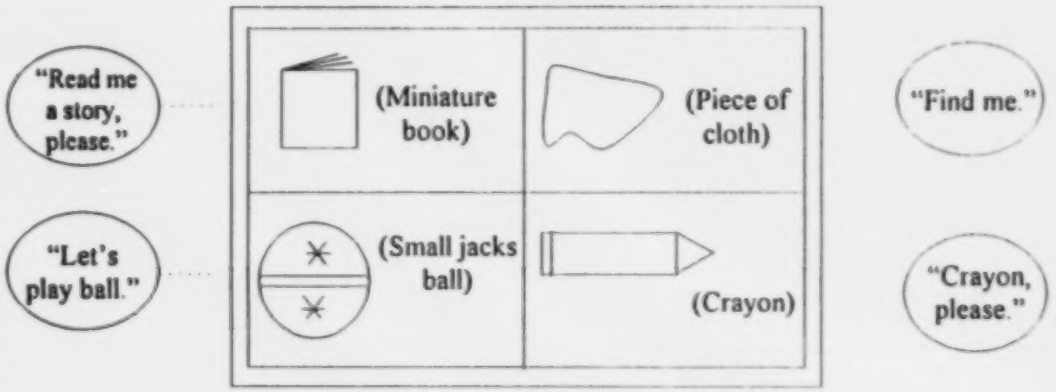
Situation	Choice Between Two Options	Symbols for Choice Displays
Choice of breakfast food	Cereal or eggs	Sample size box of cereal; toy egg
Choice of manipulative toy	Legos® or blocks	One piece of each
Choice of fast food	McDonalds or Pizza Hut	Happy Meal bag; Personal Pan Pizza Box or pizza cutter
Choice of activity	Hide and Seek or bike ride	Miniature figurine that is covered by a cloth; flag similar to the one attached to the real bike frame

What might be the appearance of a tangible symbol communication display?

Appearance involves two dimensions: physical characteristics and focus of content. The physical characteristics will be discussed first. As mentioned earlier, a tangible symbol display could be mounted on an electronic communication device or on a non-electronic display. In the former instance, the tangible symbol would serve as an associative cue. A child could press a particular square on a electronic device display and activate a specific voice-output message (see Figure 7a).

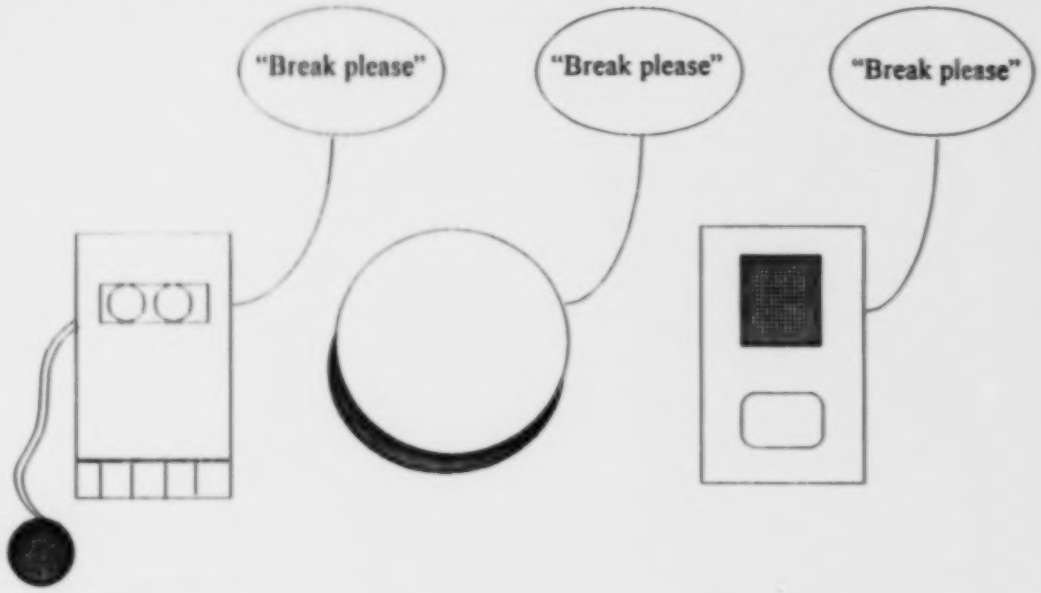
Although some lower technology devices would only produce single voice output messages, the interventionist could use a tangible symbol mounted on (a) a switch which connects to a tape recorder with a closed loop tape, (b) a free-standing/voice output switch such as the BIGmack® (Ablenet), or (c) a miniature message-aide. These examples are illustrated in Figure 7b. The single message devices in and of themselves could also be potential tangible symbols.

Figure 7a. Electronic Communication Board Displays with Voice Output



Electronic device -- 4 item display

Figure 7b. Low Technology Voice Output Displays



Single message electronic options

Non-electronic displays represent the other option. Displays can be mounted (a) in compartmentalized trays, (b) on flat surfaces such as carpet squares, or (c) on compartmentalized symbol vests (Goossens', Crain, & Elder, 1992). The number of items and the type of items used will be individually determined. An example of an activity-specific display is depicted in Figure 8.

As stated earlier, the focus of the content on a display is also an important consideration. Options for a display include (a) a global display that covers a variety of situations, (b) topic or activity specific boards that support a given task, and (c) a combination of the two. The message content of the three displays would be different for the same individual. Topic or activity board messages

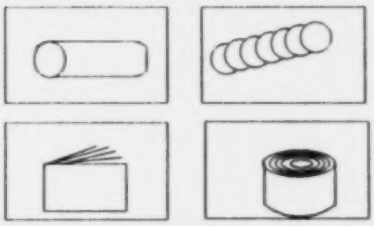
could support activities such as dressing, cooking, playing a game, reading a book, and so forth. A given individual could have many topic displays. At the same time he or she may have only one generic display that is supposed to cover all communication situations. Generally the exclusive use of either one is not satisfactory and a mingling of the two strategies seems to provide better support for the targeted individual. Knowledge of these distinctions becomes important since memory and motivation will be factors involved in successful use of tangible symbols for expressive communication.

Some individuals may only be able to remember the specific representations for a limited number of messages. Activity boards usually contain some temporary vocabulary that is not needed once the activity is over. The sample display in Figure 8 is a combination display. It also contains two messages that are more global (i.e., messages that relate to being finished with a task and to needing to use the restroom or bathroom). These messages should probably appear on every activity board. These associations will need to be retained in long term memory since they transcend specific activities. (Some monitoring may be needed as to how many permanent message associations the individual can retain in memory and use appropriately). The transparency and concreteness of the symbols may contribute to the total number that can be remembered by some individuals who may have limited memory storage or retrieval strategies. When faced with limited retention, the programmer must carefully choose the items that constitute the permanent subset of messages. The messages should reflect what the individual finds important to convey from his or her perspective. He or she may wish to have a repertoire of messages by which to have some control over his or her environment. This might translate into messages that request high interest items and that give the person space or downtime. The latter is illustrated in Figure 8 as the person requests to go to an area in which he can relax and enjoy a favorite relaxation task such as looking at catalogs.

Figure 8. Hypothetical Tangible Symbol Activity-Focused Communication Board

Setting: Small group art activity in a kindergarten classroom with typical peers.

Activity: Stringing uncooked pasta and wooden beads to make a necklace for a class play. Peer will hold the shoe string and assist with stringing, as needed. Stringing supplies must be requested from a student who functions as Materials Manager for the activity.



Symbolization: Mixed types of tangible symbols

Display: Carpet square of indoor/outdoor carpeting with several cards with objects mounted on them. The cards are attached by Velcro® to the carpeting. *This type of display will be functional only if the child can attend to several symbols and if he does not fixate on destroying or engaging in self stimulation with the display cards.*

Figure 8. Hypothetical Tangible Symbol Activity-Focused Communication Board (continued)

Translation of Object-Meaning for Topic Communication Display

Object	Message	Type of Symbol Used
Bead	"Give me some beads."	Identical; partial for a quantity/set
Long piece of pasta	"Give me some macaroni."	Identical; partial for a quantity/set
Miniature book[2a]	"Finished. I'm going to the beanbag chair. I'm going to look at my catalogs."	Miniature; generic
Almost empty roll of bathroom tissue[2b]	"I'm going to the bathroom."	Associative

Procedures: Individualized for hypothetical kindergartner with developmental disabilities.

1. Child is shown a model of the end-product (i.e., a necklace). The necklace components are matched to identical materials mounted on cards attached to a carpet square.
2. The peer shows the child a shoe string which forms the base of the necklace. The peer points to an item on the carpet square display (e.g., the macaroni) and the Materials Manager (another child) dispenses 2-3 pieces of macaroni.
   One item could be given, per request, if the target child is too distracted or excited by getting several pieces at once.
3. The child is then asked what he wants for his necklace and is prompted/assisted to point or to give the card to the Materials Manager (similar to steps one and two of the Picture Exchange Communication System program described in Frost & Bundy [1994], except that tangible symbols are the stimuli for the exchange.)
4. The child is kept on task by the interactions of the peers until he tires, completes his necklace, or builds a necklace with at least several beads and pieces of pasta.

[2a&b]These items represent model alternative ways of indicating a desire to leave an activity. They represent a more socially acceptable alternative to screaming, hitting, throwing, running away, and so forth. Their use would need to be taught and the adults would need to consistently respond to them. Otherwise, the adults would be inadvertently encouraging the child to escalate to more typical negative ways of indicating a need to leave or to be finished with a task.

Where does one begin (i.e., with a schedule, sequence, choice or communication display)?

References to the concepts of individualization and experimentation have appeared numerous times in this publication and the situation does not change with regard to this question. Perhaps the question of whether a programmer is being reactive or proactive may provide some guidance. A reactive situation is one in which the programmer is trying to alter or modify problem situations that occur with some degree of frequency. In a proactive mode, a programmer is trying to prevent problems from arising and is putting positive strategies into place before negative situations occur.

If caught in a reactive mode, the situations that are the most troublesome might dictate where to start. For example, if a person becomes aggressive every time he is expected to make a transition, beginning with schedule information might be of the highest priority before introducing other uses. If a person becomes self-abusive because he has forgotten to perform a certain step in a routine, then sequence information for that situation might be an appropriate starting point. If a person becomes abusive when told to do something, maybe offering a choice should be the starting point. If the person loses control after sitting and being on task for a specific amount of time, then introducing a way of requesting a break (as well as shortening the time on task) may be paramount.

If there is no behavioral crisis and one can be proactive, starting with a communication display might be appropriate. Several reasons, would seem to support this position:

- The individual might more quickly grasp the power concept of tangible symbol use when he sees messages that are of importance to him influence the behavior of others or get him what he wants.

- Because of the motivational factor inherent in conveying messages of personal importance, the programmer can see how quickly the individual grasps the concept of symbolization and may decide to experiment with a picture symbolization system, if there is very rapid acquisition.

- The learner may be more cognizant and ready to learn new symbol-meaning connections of other symbolic objects after some positive experiences with a limited tangible symbol communication display. Well-designed communication display experiences usually utilize an active learning mode while schedules and sequence displays would represent more passive engagement experiences with symbol sets. *Learning is usually facilitated by active engagement.*

- While choice displays offer some element of communicative expression (i.e., requesting), they are limited to that communicative function. For the person who does have preferences, the programmer must remember to select options that do not represent impossible decisions. Some preferences that may be highly motivating for the individual may be difficult to both represent and display in initial choice teaching situations. For example, if the individual wants a break or free time to do what he wants, what might be the contrast choice? How does one get the meaning across to the individual? When focusing on communication and not choices between two or more items, the message for "break" could be signaled by a single message device which serves as its own tangible but abstract symbol (e.g., a red switch which activates a tape recorder which says "break").

Because the communication option is so powerful, if implemented well, programmers may wish to at least consider it as a first choice even for individuals who are in a reactive situation. Teaching some communicative responses first, as suggested above, might produce faster insight into the concept of symbolization than might happen if schedules, sequences, or choice displays were introduced first.

Summary

This publication has discussed the differences between tangible objects and tangible symbols. The use of the latter appears to be an overlooked or under-utilized technical option for augmentative/ alternative communication (AAC) as well as for schedules, sequences, and choice displays. Many factors were discussed that need to be considered in the selection of tangible symbols and their implementation into a program; these factors are summarized in Attachment B in the Appendix. Careful planning, experimentation, and evaluation appear to be required in the quest to establish a match between abilities and needs, preferences, and an array of symbols/messages for specific individuals with disabilities. For some, tangible symbols might represent another access point into the world of communication.

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Appendices

Appendix A: Communicative Functions

Appendix B: Checklist When Considering Programming with Tangible Symbols

Appendix A:
Communicative Functions

Everyone engages in communicative acts every day. Some acts are more easily noticed or understood than others. This report provides examples of several classes of communication messages, shows a variety of ways or means of communicating a message, and supplies examples of messages that are not always consciously signaled by the child/adult with disabilities. These ideas are usually identified by specific terms which are defined below.

Means of Communication: Regular speech, echolalia, vocalizations, gestures, signs from manual sign language, communication boards, electronic communication devices, handwriting, typing, or pulling someone to a location are some of the different means by which messages are conveyed.

Communicative Function: All messages have a basic underlying purpose such as the seeking of an object or information, refusal, provision of information, indication of agreement, or social engagement.

Communicative Intent: Not all messages are deliberately signaled to a communication partner. Sometimes the partner has to notice the behavior of the other person and then assign meaning or intent to it. For example, a person could intentionally tell someone, "No, I don't want to fold the towels." The same message might be surmised from a behavior such as someone tipping the basket contents onto the floor and then defiantly walking away.

Recognizing the diversity of communicative functions that might be expressed (whether intentional or not) and having an awareness of the multiple means by which messages can be expressed are central to understanding the communication of individuals with expressive communication disabilities and to building a positive communication program for them.

Function	Example of situation and communication means used
I. Requests	
A. Wants tangible object	1. Says "drink" to teacher 2. Takes person to refrigerator 3. Points to picture of popcorn on communication board 4.** Says "trick or treat" anytime candy is wanted
B. Wants an action, event, or activity to occur.	1. Says "go Target" 2. Points to phrase "scratch my back, please" on communication board 3. Spells "watch basketball" on a spelling board via the aid of a facilitator 4.* Rubs eyes and looks tired. (Parent directs child to get ready for bed.)
C. Wants attention.	1. Signs "help" 2. Says "Mom" repeatedly until she comes 3.* Goes to block area, picks up some blocks, and randomly begins to throw them. (Adult will automatically come over and show child how to constructively play with blocks.)
D. Seeks permission or direction.	1. Turns and looks to see if adult indicates that it's ok to open the cabinet to get a cracker for snack 2. Holds crotch and says "teacher" until told that it is ok to proceed to the bathroom
E. Wants or needs information.	1. Looks at adult with puzzled expression when told to go to the office 2.* Begins to throw things and screams when told that Mom will be late for pick up today. ("Lateness" is abstract concept. Child does not know when Mom is coming to get him.) 3. Asks "home?" (Rising inflection indicates that the child wants to know whether it is time to go home.)

(Continued)

(Continued from page 34)

Function	Example of situation and communication means used
II. Negative assertion or disagreement	
A. Refuse, reject, or protest a directive, action, activity, or object.	1. Says "no" 2. Pushes work materials away 3.* Hits self in face after being told to go to X 4.* Screams when favorite toy is not in its usual place on the shelf
B. Denial.	1. Shakes head when told it is his turn to water the plants. (Indicates that it is actually someone else's turn.) 2. Says "no John" when someone mistakenly calls him "John"
III. Comments	
A. Names or comments on objects, people, or activities.	1. Says "Mickey Mouse" as he sees the words in advertising for Disneyland 2. Says "charge" as he hears the charge sound on TV during a ball game 3. Signs "dirty" with regard to Kool Aid on peer's shirt 4. Points to "home" on communication board as he recognizes a toy on shelf Does not try to take toy. (Message indicates he has same toy at home.)
B. Comments on self or expresses feelings.	1. Points to ear and "hurt" on communication board 2. Signs "sleep" and puts head down 3. Spells "I'm frustrated" on computer with a facilitator providing support at the wrist 4.* Jumps up and down with excitement
C. Agreement or affirmation.	1. Nods head "yes" 2.* When asked if he wants a cookie, he reaches out and takes it 3.** Mother asks, "Do you want some juice?" as she pours juice into a glass. The child repeats her question and grabs the juice

(Continued)

(Continued from page 35)

Function	Example of situation and communication means used
IV. Social Routines	
A. Initiates interaction.	1. Says "what's your name?" and may continue with a routine of other questions 2. Walks up and touches the hair of a familiar adult
B. Selected examples of social functions.	1. Says "thank you" with communication device 2. Signs "sorry" when he steps on someone else's foot 3. Waves "bye" with a facilitator providing support at the elbow
* Represents non-intentional communicative behavior ** Represents purposeful or functional echolalia	

Appendix B:
Checklist When Considering Programming with Tangible Symbols

Keywords for the process: thoughtful analysis, hypothesis formation, hypothesis testing, evaluation, and revision of strategy, as indicated.

(This list is not inclusive of all questions that may need to be asked).

- ❑ What do you know about the visual abilities of the individual with disabilities, what more do you need to know, and what are the potential implications of the information?
- ❑ What information do you have about the cognitive abilities of the individual (although findings of low ability are not always accurate)? Do other people hold different opinions based on their observations and interactions with the individual?
- ❑ Are there any special characteristics relative to the person's type of disability that must be considered in the planning?
- ❑ What do you know about the memory storage and retrieval abilities of the individual?
- ❑ Do you have information about how the person presently communicates? Is he or she effective and under what circumstances? What messages seem to be the basis for the communicative behavior?
- ❑ Has previous programming with object or picture symbols been tried? What were the results and conclusions?
- ❑ Should programming begin with tangible objects rather than tangible symbols? What reasons can you give for your decision?
- ❑ Should the symbols you select be transparent or can you use translucent or abstract ones?
- ❑ Should you begin programming with expressive communication as a focal point, or focus on a choice, schedule or sequence display?
- ❑ What messages or types of information need to be transmitted?
- ❑ How are you going to represent the messages or bits of information? Use Table 1 to evaluate the types of symbols you might use.

- ❑ Have you considered the size of the object, the color, or other features as important in recognition or learnability of the symbol?
- ❑ How will you display the object? What are the factors besides figure-ground and number of items that you should consider?
- ❑ Do you want to use an electronic display with voice output or a non-electronic display for communication training and use?
- ❑ Is independent use of a display one of your goals? Must this be rigidly adhered to in order to prevent confusion or is the person somewhat flexible in varying circumstances?
- ❑ Must you keep tangible object use vs. tangible symbol use clearly marked for the individual?
- ❑ What generic messages will need to appear on all activity displays?
- ❑ Will you periodically check for transfer of the symbolization concept to pictured format?
- ❑ Is your plan fostering positive experiences and success for your child, student, or client?
- ❑ How will you respond if the individual uses a response mode other than tangible symbols? Would you ignore or acknowledge other communicative forms as communicating a legitimate message?
- ❑ How long will you stay with a level of intervention before shifting? (Sometimes it may take 2-3 weeks before the individual adjusts to a format and consequence. In other situations, it is immediately obvious that a programmatic change is needed).
- ❑ How will you evaluate your decisions? Has a team and a review process been established?